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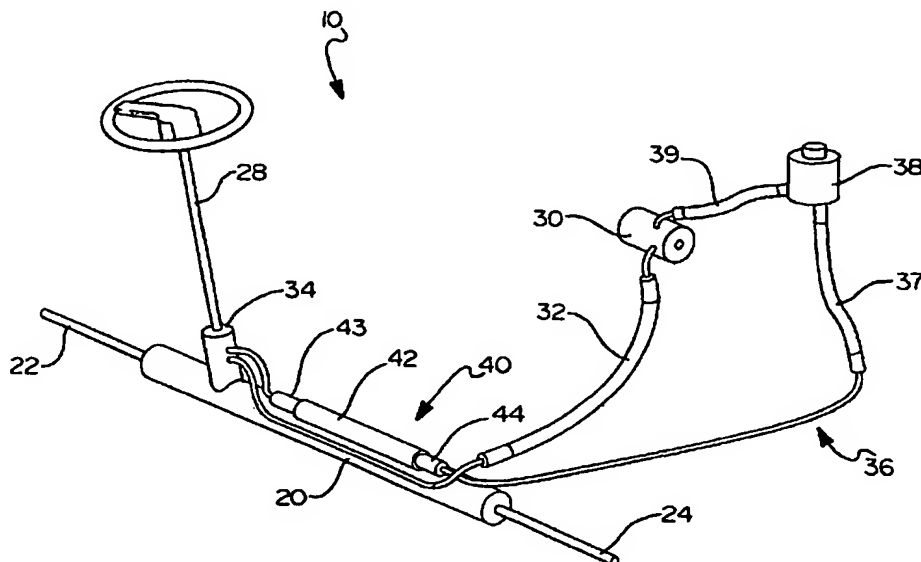
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[Continued on next page]

(54) Title: FLUID DISTURBANCE DAMPING IN FLUID DRIVEN ACTIVATION DEVICES.



(57) Abstract: Pressure disturbances in the driving fluid of an actuation device (10), such as a vehicle power assisted steering system, that give rise to noises or vibration discernible to vehicle users are damped by including in the hydraulic circuit a damping hose (42) having a peripheral wall that defines a fluid containing space of non-circular cross section, permitting such disturbances to deform the wall shape locally to vary the cross sectional area without relying upon stretching of the wall. Suitable hose form are those defining a cross section which is elliptical or with opposite wall parts tending to close together without fluid pressure, and preferably is disposed in the lower pressure return line (36) between fluid driven actuator (26) and pump (30), adjacent the actuator when that is a source of noise or vibration to be damped.

**Declarations under Rule 4.17:**

- as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii)) for the following designations AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, UZ, VC, VN, YU, ZA, ZM, ZW, ARIPO patent (BW, GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG)

- as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii)) for the following designation US
- of inventorship (Rule 4.17(iv)) for US only

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20 January 2005

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

INTERNATIONAL SEARCH REPORT

PCT/GB2004/001424

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 B62D5/06 F16L55/45 F16L11/12

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 B62D F16L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the International search (name of data base and, where practical, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y	GB 2 265 959 A (FORD MOTOR CO) 13 October 1993 (1993-10-13) page 1, lines 11-19 page 3, line 213 figures 2-5	1-3,5-8, 11 4,13-17, 19-29
X	US 6 076 557 A (CARNEY THOMAS JAMES) 20 June 2000 (2000-06-20) column 8, line 11 column 9, lines 29-67 figures 34-37 ----- -/-	1,5-7,11

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents:

A document defining the general state of the art which is not considered to be of particular relevance

E earlier document but published on or after the International filing date

L document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

O document referring to an oral disclosure, use, exhibition or other means

P document published prior to the International filing date but later than the priority date claimed

T later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

X document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

Y document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

Z document member of the same patent family

Date of the actual completion of the International search

20 September 2004

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11.10.04

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INTERNATIONAL SEARCH REPORT

PCT/GB2004/001424

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
E	WO 2004/040187 A (KALTSOUNIS NICHOLAS O ; DANA CORP (US); CORTESE MARY (US); DARRAH MATT) 13 May 2004 (2004-05-13) page 1, line 24 page 3, line 1 - page 5, line 18 figures	1
Y	US 4 285 534 A (KATAYAMA TOSHIYUKI ET AL) 25 August 1981 (1981-08-25) cited in the application	4
A	column 2, lines 30-33; figures	1
Y	GB 1 079 389 A (GEN MOTORS CORP) 16 August 1967 (1967-08-16) page 3, left-hand column, line 4 - right-hand column, line 123 figures	13-17, 19-29
Y	US 6 279 613 B1 (CHEN YUNGRWEI ET AL) 28 August 2001 (2001-08-28) column 2, lines 33-35	14,25,28
A	column 6, lines 11-60; figures	13,27
A	DE 35 10 267 A (TOYOTA MOTOR CO LTD) 3 October 1985 (1985-10-03) abstract; figures	13,27

INTERNATIONAL SEARCH REPORT

International application No.
PCT/GB2004/001424

Box II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☒ Claims Nos.: 9, 10, 12
because they relate to subject matter not required to be searched by this Authority, namely:
see FURTHER INFORMATION sheet PCT/ISA/210
2. ☐ Claims Nos.:
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this International application, as follows:

see additional sheet

1. ☒ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remarks on Protest

☐ The additional search fees were accompanied by the applicant's protest.

☒ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

Continuation of Box II.1

Claims 9, 10 and 12 are appended on claim 1, these claims solely define features relating to a method of using the damping arrangement of claim 1. These claims do not confer any supplementary definition to the subject-matter of claim 1, they are therefore unclear and do thereby not fulfil the requirements of article 6 PCT.

INTERNATIONAL SEARCH REPORT

Information on patent family members

PCT/GB2004/001424

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
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